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TETANUS INTOXICATION IN THE ABSENCE OF LIVING TETANUS BACILLI

(Following is the translation of an article by Dr. Rolf Scheidt, of the Clinic of Surgery, Univ. of Marburg, published in the German language periodical Munich Weekly Medical Bulletin, vol. 86, 1939, pp. 959-960. Translation performed by Constance L. Lust.)

In all published reports that are concerned with the clinical picture of tetanus, as well as in a textbook about this subject, the cases of major importance are always concerned with the fact that living tetanus bacilli are found in the wound.

We have recently had the opportunity to observe a case in our clinic which was of unusual origin, For this reason we feel this specific case merits publication.

This case was an accidental poisoning with dry tetanus toxin in a 24 year old laboratory technician of the Behring-Works in Marburg. The dry tetanus toxin is used to immunize horses in order to produce antitoxin.. The toxin is isolated from toxic filtrates of cultures of tetanus bacilli. Saturated ammonium sulfate is added and the sediment is collected and dried on porous clay dishes. After drying, the material is ground up finely in a mortar. The lethal dose of toxin for a mouse is 1 micro gram.

The clinical history was noted as follows: The patient was involved in the preparation of toxin four times in the two-week period prior to his admission. He was admitted February 28, 1939. His particular job was to grind the dry tetanus-toxin under a protective glass bell jar. So that none of the dry, fine powder that was produced during grinding was inhaled, the grinding was carried out in an air tight container. The technician also wore rubber gloves on his hands. The last time he performed this work was four days prior to admission. February 22, that is 6 days before admission, the patient contracted temporary cramp-like contractions in his right eye and in the muscle-structure of the right eye lid. Three days later he noticed an increasingly strong tension in the lower jar. He was no longer able to open his mouth fully. On February 27, pain occurred in his back along with tension in the pit of his stomach. He had difficutly breathing.

Upon admission the following was noted. Weight 70 kg.; slender, strong man. The jaw (mandibal) was somewhat harder than normal. Head movement occurred freely. His neck was not stiff. The mouth can be opened only very little. The inner organs exhibit no adverse clinical findings. The reflexes are normal. Abdominal respiration was completely stopped in the prone patient. Only with a great deal of effort can he move the abdominal muscles. Temperature 36.8°C; pulse 72. The diagnosis was; tetanus intoxication.

For the next 5 days the patient regularly received 40,000 units tetanus antitoxin. Temperature and pulse showed no alterations. On the twelfth day of the illness the patient was released in normal, good health. The symptoms on the side of his jaws, as well as those of his diaphram, disappeared completely in the 8th day of the illness.

During the treatment of this patient we were informed that a similar case had already been handled once in a neighboring clinic. However, the origin of that illness was more obscure. For the sake of completeness the case-history follows.

This case also involved an employee of the Behring-Works. He was 26 years old, and previously had never been seriously ill. On November 11,1932 he suddenly became ill together with paralysis of the jaw; that is, he could not open his mouth. He had no pains. He felt only tired and malaise. On November 14, other symptoms began to appear. Back pains and head aches appeared. Temperature did not rise, but his throat became inflamed and rough. Also, both eyes became slightly hypersensitive at this time.

When the patient was admitted for treatment he stated that his eyes felt as if he were constantly in a room heavy with tobacco smoke. He, himself, suspected that his illness was probably somehow involved with tetanus infection since he was isolating and preparing tetanus toxin. However, since no evidence was found for a tetanus infection, particularly no mode of entry (wounds, etc.), the following diagnosis was given: Dentitio difficialis of the right lower wisdom tooth. The patient was referred to the dental clinic for treatment. On November 26 after an 8-day observation he was released. On December 12 he was readmitted because tightening of the jaw and backaches started to increase again. There was difficulty in taking adequate nourishment; he could only live on liquid foods. Also, three days before cramps had appeared in his legs, which went away by exercising. During the attacks of leg-cramps the patient felt severe backpains. His lower back became hollow and he buried his head in the pillow. His arms were not affected.

The following report was noted. Medium-build, somewhat undernourished. A very definite stiff neck existed. During the readmission the patient lay in bed and his head moved aimlessly. The jaw could not be opened, and the jaw muscles were hard as boards. The patient could open his eyes only with strenuous effort and then only partly. The reflexes of the upper extremeties were markedly inhibited. Besides this a marked food and knee-cap clonus existed. Sensibility was normal. The Babinski reflex (phenomenon) was 1 positive.

The patient immediately received high doses of tetanus antitoxin and this was continued to the 8th day. On the average 100,000 units were administered intravenously daily. On the 8th day of illness exanthema developed, which became an exanthema of the serum on day 9 and 10 together with a temperature rise to 39°C and a pulse of 110. On day 15 the temperature and pulse returned to normal, as did the exanthema. The patient was released in good health after 5 weeks.

In both cases of illness tetanus apparently came about by absorbing a minute quantity of the dried toxin in dust form. The pathway from the nose-that is mucous membrane of the pharynx, as well as from the membrane of the eyes to the site of action is short. The incubation period is also very short. Even though the earliest symptoms are meager, they should not be missed since then the tetanus exerts its maximum effect. This became apparent from the second case described above. The reason for the enhanced effect is that the toxin may accumulate in greater quantity at the sites of action in the brain cells, since the toxin dust stored in the membranes of the nose and eyes is serving as a continuous source. In this way one may also explain why the effect is more drastic if treatment is not started until a relatively late period after exposure.

In one manner these cases of intoxication are favorable compared to regular infection by tetanus bacilli. In a regular infection new toxin is produced continuously within the host during treatment and this may eventually overwhelm the patient.

The tetanus antitoxin produced by the Behring-Works was found to be extremely effective in the first case (patient) described. It was used at a concentration of 20,000 units in 5 ml serum. Temperature and pulse rate showed no changes during 5 days of repeated, intravenous injection. The urine also remained free of pathological constituents. On exanthema of the serum did not occur. It is also more pleasant, both for patient and physician, to inject 20-30 ml of antitoxin daily during the course of treatment. Previously 100 ml quantities had to be administered to obtain the same results. The highly concentrated serum offers yet another advantage. It contains little protein and may thus be administered for much longer periods of time. This may be especially helpful in cases of severe intoxication.